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A Model for Financial Programming

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Abstract

This paper presents a simple simulation model that enables the formulation of a consistent growth-oriented, medium-term adjustment program. The applied version is available in Excel (using data for El Salvador) and can be used directly as a financial programming tool that provides a range of standard IMF performance criteria together with a complete set of consistent accounts for the real, monetary, public, and external sectors of the economy. Medium- and long-term growth considerations are incorporated through a neoclassical production function at the same time as monetary and fiscal policies are adjusted to satisfy the requirements for internal and external balance.

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Summary

A simple simulation model enables the formulation of a consistent growth-oriented, medium-term adjustment program. The applied version is available in Excel and can be used directly as a financial programming tool that provides the output usually used by the IMF in its country work, including a range of standard IMF performance criteria and a complete set of consistent accounts for the real, monetary, public, and external sectors of the economy. The IMF's tool for designing economic adjustment programs, generally referred to as financial programming, is largely based on practical experiences obtained through country work. The advantages of defining financial programming in the form of a model are that consistency and transparency are ensured and that the implications of changes in the program assumptions--including revised historical data, new projections of variables determined outside the model, and changes in program objectives--can be determined more rapidly and efficiently.

The basic structure of the model is formulated in terms of the demand and supply of goods, money, and foreign exchange. The money and foreign exchange markets are assumed to clear always, while long-term considerations are introduced in the goods market where short-term demand may be different from the long-term supply of goods. In the short-term, both monetary and fiscal policies are taken into account, while the long-term analysis also reflects neoclassical growth behavior.

A practical application of the model is derived using data for El Salvador. Based on annual data through 1996, the model is simulated for the period 1997-2001 using a representative set of coefficients. The required input tables for the simulation and a range of output tables are presented and the resulting stabilization program is discussed briefly.

I. Introduction

A consistent and transparent framework for the financial programming exercise requires a precise description of the relationship between program instruments and program objectives. The purpose of this paper is to present a simple simulation model that enables the formulation of a consistent growth-oriented medium-term adjustment program. The ultimate objective, however, is to provide a starting point for a basic tool that facilitates the financial programming and contributes to enhance productivity in the IMF's country work. Therefore, the final output of the model would be a range of performance criteria (basically the same set currently used in programs), which are supposed to provide the basis for the adjustment program, together with a complete set of consistent accounts for the real, monetary, public, and external sectors. By introducing the financial programming exercise into the framework of a model, changes in program assumptions--including revised historical data, new projections of variables determined outside the model, and changes in program objectives--could more easily be analyzed and the implications for the various sectors of the economy would immediately be detected. To demonstrate the practical applications of the model, simulations on data from El Salvador is made available in Excel using the solver utility.

The IMF's approach to economic stabilization, generally referred to as financial programming, is largely based on practical experiences obtained through country work. There are surprisingly few written studies on its theoretical foundations, and even less material exists on more applied applications of the approach. Some of the earlier works by IMF staff members include Polak (1957), Robichek (1971), Crockett (1981), and Guitián (1981). Since the extensive review of the IMF's analytical framework underlying the design of financial programs published in IMF (1987), a few studies on the subject have been published, but most of them have been more narrow in their objectives in the sense that only certain specific aspects of the framework were analyzed.[2] However, the theoretical structural adjustment model developed by Khan and Montiel (1990) and applied by Reinhart (1991) takes a more broad view by combining the monetary approach to the balance of payments with a neoclassical growth model. Several of the building blocks used in the model presented below are similar to the model specified by Khan and Montiel. Also, Barth and Chadha (1989), Haque, Lahiri and Montiel (1991) and Bier (1992) have developed more comprehensive simulation models, but in these papers the financial programming framework is not in the center of the analysis and it is therefore not possible to base the program directly on the output from these models. In a recent article, Fischer (1997) review the basics of a IMF program design and demonstrates the links between the balance of payments and the balance sheet of the central bank which in turn is linked to the government budget constraint.

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[2]See Chand (1987) where the growth aspects of financial programming are reviewed; Lorie (1989) for program considerations in relation to the treatment of debt rescheduling; and Johnston (1993) where the implications of the transition from direct to indirect monetary instruments are analyzed.

Since the theoretical underpinnings of the financial programming framework are not fully covered, the model presented here obviously represents only one interpretation of the process. Furthermore, since an important objective of this study is to ensure that the program is structured consistently with all the main linkages between the sectors of the economy clearly defined, there might be certain aspects of the model defined below that (maybe depending on the country) in practice are currently left out of the financial programming exercise.

The rest of the paper is organized as follows. The behavioral relations and the main accounting identities for the goods, money, and foreign exchange markets together with the public sector budget constraint are presented in section II. Some simulation experiments are conducted based on data for El Salvador in section III, and it is explained how these simulations are used to formulate a financial program. Concluding remarks are in section IV.

II. The Model

The basic structure of the model is formulated in terms of the demand and supply of goods, money, and foreign exchange. The money and foreign exchange markets are assumed to clear always, while long-term considerations are introduced in the goods market where short-term demand may be different from the long-term supply of goods.[3] The overall domestic inflation and medium-term output growth are set as exogenous targets for the program while the exchange rate is assumed to be flexible and market determined. As an alternative to the flexible exchange rate, the model has an option of a fixed exchange rate regime combined with an external financing gap. The dynamic specifications of the model are kept relatively simple. The general nature of the model implies that it is not based on any particular view of the economy or on a single school of economic thought.[4] In the short-term both monetary and fiscal considerations are taken into account, and neoclassical growth explanations are reflected in the long-term analysis.

The domestic supply of goods in the long-term is determined according to a neoclassical production function and the demand side is determined from consumption,

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[3]This implies that the aggregate supply curve is non-vertical in the short-term and vertical in the long-term. This means that fiscal and monetary policies can influence output in the short-term, but not in the long-term.

[4]One example is the approach to the balance of payments, where in the context of the more general model presented here, the contradictions between the analysis of the monetary approach, where the balance of payments is determined as the difference between the change in demand for money and the change in net domestic assets, and the Keynesian elasticity approach are reconciled and are allowed to exist as complimentary partial approaches. See Frenkel, Gylfason and Helliwell (1980) for a synthesis of monetary and Keynesian approaches to the balance of payments.

investment and net exports of goods and services. Behavioral relations are defined for private consumption and imports of goods and nonfactor services while public consumption and investment as well as exports of goods and nonfactor services are assumed to be determined exogenously. Private investment is determined from the production function as the growth rate of output is given as an exogenous target. The level of output in the short- and long-term converge over time through changes in the price level. The money market is specified by the supply and demand for money, with the supply linked to the stock of reserve money of the central bank. With all foreign financing items determined exogenously and a target on gross foreign exchange reserves of the central bank, the flexible exchange rate ensures that financing gaps/surpluses of the balance of payments are closed. With the exchange rate providing equilibrium in the external sector, the monetary and fiscal policies required to equilibrate the goods and money market at a price level that satisfies the target for domestic inflation can be determined. Given the target of net foreign assets of the central bank, the net domestic assets of the central bank that is consistent with equilibrium in the money market can be determined, while the mix of fiscal revenue and domestic financing, for given expenditures, at the same time can be determined to restore equilibrium in the goods market.

A. The Goods Market

With all variables measured in real terms, the supply side of the goods market is represented by the following relations

$$\Delta \ln q_{lt} = \alpha_1 \Delta \ln k_t + \alpha_2 \Delta \ln l_t + \alpha_3 \quad (1)$$

$$k_t = i_t + (1-\delta)k_{t-1} \quad (2)$$

$$i_t = i_{gt} + i_{pt} \quad (3)$$

$$\Delta \ln q_{lt} = \ln(1+g_{lt}) \quad (4)$$

where q_{lt} is domestic output (real GDP) in the long-term, k_t is the stock of aggregate capital at the end of period t; l_t is the stock of labor; i_t is total investment; i_{gt} is public investment; i_{pt} is private investment; g_{lt} is the long-term target growth rate of real GDP; and Δ is the difference operator. The first equation is a production function explaining long-term growth of real GDP as a function of the growth rate of capital, the growth rate of labor inputs, and a constant rate (α_3) of change in total factor productivity. α_1 and α_2 are the marginal product of capital and labor, respectively. In (2), the stock of capital is defined as the stock of capital by the end of the previous period, less depreciation, plus gross investment. Total investment is divided into private and public investment in (3), and real GDP growth in the long-term is treated as an exogenous target given by g_{lt} according to (4). According to standard IMF practice, programs are based on a predetermined short-term growth rate of real GDP. However, it is important to note that in the model presented here the exogenous growth target in (4) is on long-term growth, since the short-term growth rate cannot be determined independently of the exogenous inflation target which again is linked to the fiscal and monetary policy requirements.

The long-term growth rate of real GDP determined from (1) should be interpreted as the expected growth rate over the long-term. In other words, the long-term growth rate is not the upper capacity limit for growth, but rather the rate at which the actual growth rate tends to fluctuate around given the changes in factor inputs and total factor productivity. Ideally, fiscal and monetary policies should therefore be directed to ensuring that output growth in the short-term stays around the long-term rate.

The growth target of the program should be sustainable over the long-term. The specification of the production function (1), which is a technical relationship, is an essential element for the determination of the sustainable growth rate. In the long-term, sustainable growth requires that the capital-output ratio is either constant or decreasing, since an increasing path would converge to a point where all domestic resources are used to keep the stock of capital at the level required by an excessive growth target. Obviously, increasing domestic and foreign savings can postpone the crisis, but they cannot change the underlying fundamental problem. The highest sustainable growth rate is obtained at the point where the capital-output ratio is constant (assumes that the capital coefficient is less than one), which implies that the growth rate of real GDP and capital must be the same in the long-term. By setting the growth rate of real GDP and capital equal to g_{lt} in (1) and solving for g_{lt}, the following expression for the highest sustainable growth rate emerges[5]

$$g_{lt} = (\alpha_2\lambda+\alpha_3)/(1-\alpha_1) \tag{5}$$

where λ is the long-term growth of labor supply. For example, the sustainable rate of growth is 5 percent for a Cobb-Douglas production function with $\alpha_1=\alpha_2=0.5$, $\lambda=3$ percent, and total factor productivity (α_3) of 1 percent. In the following it is assumed that the long-term growth target is lower than or equal to the expression in (5).

The practice to base the program on a predetermined real growth rate of GDP implies that the investment has to be determined accordingly, and a more rigorous specification of investment behavior is therefore not necessary. For programming purposes, the desired investment must be consistent with the long-term growth rate of real GDP. From (1)-(4), the required private investment can be expressed as a function of the growth rate of real GDP, the growth rate of labor, the stock of capital at the end of the previous period, and public sector investment:

$$i_{pt} = [g_{lt} + \alpha_2(\Delta l_t/l_{t-1}) + \alpha_1\delta + \alpha_3]k_{t-1}/\alpha_1 - i_{gt} \tag{6}$$

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[5]It is assumed that the log differences approximates growth rates, i.e., $g_{lt} = \Delta\ln q_{lt} = \Delta\ln k_t$.

Note that for $\alpha_1=1$, $\alpha_2=\alpha_3=0$, and $\delta=0$, (6) reduces to the so-called ICOR formulation where investment is determined as a fixed proportion of the targeted absolute change of real GDP.[6]

The demand side of the goods market is represented by the following components measured in real terms

$$q_t = c_{pt} + c_{gt} + i_{pt} + i_{gt} + x_t - m_t \tag{7}$$

where q_t is GDP, c_{pt} and c_{gt} are private and public consumption, respectively, and x_t and m_t are exports and imports of goods and nonfactor services, respectively. Public consumption and investment together with real exports are assumed to be exogenously determined. Private investment is given by (6) above and private consumption and imports are determined in logs according to

$$\ln c_{pt} = \beta_0 + \beta_1 \ln y_{dpt} \tag{8}$$

$$\ln (m_t - m_{pt}) = \gamma_0 + \gamma_1 \ln (P_{mt}E_t/P_t) + \ln [\gamma_2(c_{pt} + c_{gt}) + \gamma_3 i_t] \tag{9}$$

where y_{dpt} is private sector disposable income, m_{pt} is the exogenous determined part of imports that is directly related to project imports financed from foreign donors, P_{mt} is the foreign price level of imported goods and nonfactor services, E_t is the exchange rate defined as domestic currency units per unit of foreign currency, and P_t is the price level on output supplied domestically. Private consumption is assumed to depend solely on disposable income with a long-run income elasticity of β_2[7]. Real imports of goods and nonfactor services, adjusted for the direct import component of projects financed from abroad, are assumed to be determined as a share of real consumption and investment with the share being a function of the relative price between domestic and imported goods. The expression has been written in log terms, and it is expected that $\gamma_1<0$ and $\gamma_2<\gamma_3$.

The definitions of national and private sector disposable income are, respectively (variables in capital letters are measured in nominal terms)

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[6]The precise formulation is $i_t = \beta \Delta q_{lt}$ where β is the initial capital-output ratio k_0/q_0, or the ICOR.

[7]The applied version of the model uses an unrestricted short-term formulation of the consumption function specified in (8):

$$\Delta \ln c_{pt} = \beta_0 + \beta_1 \Delta \ln c_{pt-1} + \beta_2 \Delta \ln y_{dpt} + \beta_3 \ln c_{pt-1} + \beta_4 \ln y_{dpt-1}$$

The short-term income elasticity is given by β_2 and the long-term income elasticity by $\beta_4/-\beta_3$. It is assumed that $\Delta \ln c_{pt}$ and $\Delta \ln y_{dpt}$ are stationary time series. For more information on the application of this dynamic specification, see Brouwer and Ericsson (1995).

$$y_{dt} = (P_{qt}q_t + FS_t + G_t)/P_{qt} \quad (10)$$

$$y_{dpt} = y_{dt} - (R_t/P_{qt}) \quad (11)$$

where FS_t is net foreign factor services, G_t is foreign grants, R_t is total revenue of the nonfinancial public sector, and P_{qt} is the GDP deflator. In (10), national disposable income is defined as domestic output adjusted for net foreign factor income and foreign grants. In (11), private sector disposable income is defined as national disposable income, less nonfinancial public sector revenue (see equation (16)). Notice that nominal private sector disposable income is deflated by the GDP deflator, and not by consumer prices, which makes real disposable income less sensitive to (transitory) changes in the terms of trade.

The link between short and long-term output is discussed in sub-section E below.

B. The Money Market

The first problem to address regarding the specification of the money market is to decide on the level of aggregation. As suggested by Johnston (1993) there are operational advantages in favor of specifying the monetary program in terms of a narrow monetary aggregate such as the reserve money of the central bank or currency in circulation. However, in the following the supply and demand on the money market are formulated at the aggregation level of M1 to allow for the effects of changes in the money multiplier, but the model could easily be reformulated to reflect other levels of aggregation. In the end it is an empirical matter to determine which aggregation level provides the best basis for control over inflation and other target variables.

The supply of M1 is determined from

$$M1_t = \mu HM_t \quad (12)$$

where HM_t is reserve money of the central bank, defined as currency in circulation, bank deposits, and cash in vault. The money multiplier, μ, is defined as $(1+c)/(c+r*d)$, where c is the desired ratio of currency to sight deposits, r is the desired ratio of bank deposits at the central bank and cash in vault to sight and time deposits, and d is the desired ratio of time deposits to sight deposits.[8] From the asset side of the central bank balance sheet, reserve money is defined as the sum of the net foreign assets of the central bank (NFA_{cbt}) and the net domestic assets of the central bank (NDA_{cbt}). The long-term demand for real money is specified as

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[8]Note, the desired reserve ratio, r, is only defined for deposits and cash in vault. If government bonds are accepted to satisfy legal reserve requirements, these should be excluded from the reserve ratio as they are already accounted for through changes in the currency in circulation.

$$\ln (M1_t/P_{et}) = \phi_0 + \phi_1 \ln y_{dt} + \phi_2 \Delta \ln P_{et} \quad (13)$$

where P_{et} is the domestic price level at the end of period t, and y_{dt} is real national disposable income as defined in (10)[9]. The demand elasticity is positive with respect to real income ($\phi_1>0$) and negative with respect to the rate of inflation ($\phi_2<0$). In a similar manner as for the private consumption function, the size of the coefficients for the lagged variables determine the long-term elasticities.

The money market is always assumed to be in equilibrium, thus, the supply and demand for M1, as defined in equation (12) and (13), respectively, must be equal.

C. The Foreign Exchange Market

The current account of the balance of payments is defined as

$$CA_t = P_{xt}x_t - P_{mt}m_t + FS_t + G_t \quad (14)$$

where $P_{xt}x_t - P_{mt}m_t$ is the net export of goods and nonfactor services, FS_t is the factor service balance, and G_t is net foreign grants received. From the balance of payments identity, the external financing gap is determined as a residual according to

$$GAP_t = \Delta NIR_t - CA_t - \Delta FC_{gt} - \Delta FC_{cbt} - \Delta FC_{pt} \quad (15)$$

where ΔNIR_t is the change of the net international reserves, and ΔFC_{gt}, ΔFC_{cbt}, and ΔFC_{pt} are the change in net foreign borrowing of the public sector, the central bank (medium- and long-term debt only) and the private sector, respectively. The foreign currency value of all three items of net foreign borrowing is assumed to be exogenous while the change in the net international reserves are based on a policy determined target for gross official reserves in months of imports (with exogenously determined gross liabilities and net IMF position of the central bank). Also, notice that the change of the NFA of the central bank is defined as $\Delta NFA_{cbt} = \Delta NIR_{cbt} - \Delta FC_{cbt}$.

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[9]In a similar fashion as for the private consumption function the applied version of the model uses the following short-term formulation of the demand for money:

$$\Delta \ln (M1_t/P_{et}) = \phi_0 + \phi_1 \Delta \ln y_{dt} + \phi_2 \Delta\Delta \ln P_{et} + \phi_3 \ln (M1_{t-1}/P_{et-1}) + \phi_4 \ln y_{dt-1} + \phi_5 \Delta \ln P_{et-1}$$

The short-term demand elasticity with respect to income and inflation is given by ϕ_1 and ϕ_2, respectively, and the long-term elasticities are computed by $\phi_4/-\beta_3$ and $\phi_5/-\beta_3$. It is assumed that $\Delta \ln (M1_t/P_{et})$, $\Delta \ln y_{dt}$ and $\Delta \ln P_{et-1}$ are stationary time series.

The flexible exchange rate version of the model allows the exchange rate move so that the financing gap in (15) is always zero. The main channel to close the gap is through the price elasticity of the import function as specified in (9). In the alternative version of the model, the exchange rate is determined exogenously and as a result positive or negative financing gaps will exist.

D. The Public Sector

The budget restriction of the public sector is written as

$$C_{gt} + I_{gt} + INT_{gt} + NL_t - R_t = \Delta FC_{gt} + \Delta DCCB_{gt} + \Delta DCB_{gt} + \Delta B_t + GAP_t \quad (16)$$

where the left-hand side is the overall balance defined as the sum of consumption, investment, interest payments and net lending, less total revenue. The right-hand side explains the financing where ΔFC_{gt} is the flow of net foreign credit to the public sector, $\Delta DCCB_{gt}$ is the flow of net domestic credit from the central bank, ΔDCB_t is the flow of net domestic credit from the rest of the banking system, ΔB_t is financing from the nonbank private sector (bonds), and GAP_t is the external financing gap as defined in (15). Total foreign financing and net domestic credit from the central bank and the rest of the banking system are assumed to be exogenously determined (typically, domestic credit from the central bank is assumed to be reduced substantially during the program) while the public sector financing gap, which is assumed to be equal to the external financing gap, is taken from the balance of payments. The net domestic financing from the nonbank private sector is the only variable on the right-hand side that still needs to be determined.

On the left-hand-side, all variables except total revenue are exogenously determined.[10] Thus, the overall public sector budget constraint will be satisfied for an indefinite number of combinations of total revenue and net placement of bonds. However, only one combination will satisfy the equilibrium of the goods market (relation (6)) that provides the targeted domestic price level. The impact of changes in government revenue, for given expenditures, on total demand of goods mainly works through the private consumption function.

E. The Price Level

The link between aggregate demand in the short-term and long-term output is represented by a Phillips curve relationship:

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[10]Actually, the simulation model presented in section III uses public consumption and investment in percent of GDP as exogenous, and therefore the corresponding levels as endogenous.

$$\pi_t = \pi_t^* + \kappa(q_t/q_{lt}-1) \qquad (17)$$

where $\pi_t=(P_{et}-P_{et-1})/P_{et-1}$ is the rate of domestic inflation during period t, π_t^* is the rate of expected inflation during period t, and q_t and q_{lt} are short and long-term output, respectively, as defined in (7) and (4). The parameter κ is expected to be larger than zero. The expected inflation term represents the expected wage inflation and the last term reflects inflation pressure coming from excess short-term demand. In the following, it is assumed that $\pi_t^*=\omega\pi_{t-1} + (1-\omega)\pi_t^{prog}$, for $0\leq\omega\leq1$, indicating that the expected rate of inflation during period t is determined by a weighted average of the actual rate of inflation in the previous period and the programmed inflation target. A case where $\omega=0$ represents a situation of perfect knowledge and credibility in the program target, while in the case where $\omega=1$ expectations are formed adaptively and equal to observed inflation in the previous period. The inclusion of inflation for the previous period could also reflect wage compensation due to past inflation.

While (7) and (13) represent the aggregate demand curve of the economy, relation (17) describes the aggregate supply curve both in the short and in the long-term. The relationship between output in the long-term and in the short-term is more clearly stated by rewriting (17) as

$$q_t = [(\pi_t-\pi_{t-1})\omega/\kappa + 1]q_{lt} \qquad (18)$$

using the expectation hypothesis mentioned above and for programming purposes assuming that $\pi_t=\pi_t^{prog}$. Therefore, short-term output determined from the demand side must converge to long-term output to obtain a stable rate of inflation in the long-term. The classical assumption of a vertical short-term aggregate supply curve is represented by $\kappa\rightarrow\infty$. Full credibility of the inflation target ($\omega=0$, or $\pi_t = \pi_t^*$) will also imply a vertical short-term supply curve, since any excess demand in the short-term will pull the inflation rate above the target. The aggregate demand and supply curves are depicted in Chart 1. In the long-term, dynamic equilibrium is reached where the demand and the short- and long-term supply curves cross as represented in the chart by the point where inflation is π_{lt} and GDP growth is Δq_{lt}. In the short-term, changes in aggregate demand can change the combination of inflation and growth along the short-term supply curve. Moreover, since long-term growth is exogenously determined, convergence to long-term equilibrium takes place along the supply curve as well by a shift in the demand curve back to its initial position.

The underlying end-of-period domestic price level, P_{et}, is set as an exogenous target of the program and the average domestic price level, P_t, is calculated from a linear interpolation of the end-of-period price levels.[11] The overall price levels of consumer

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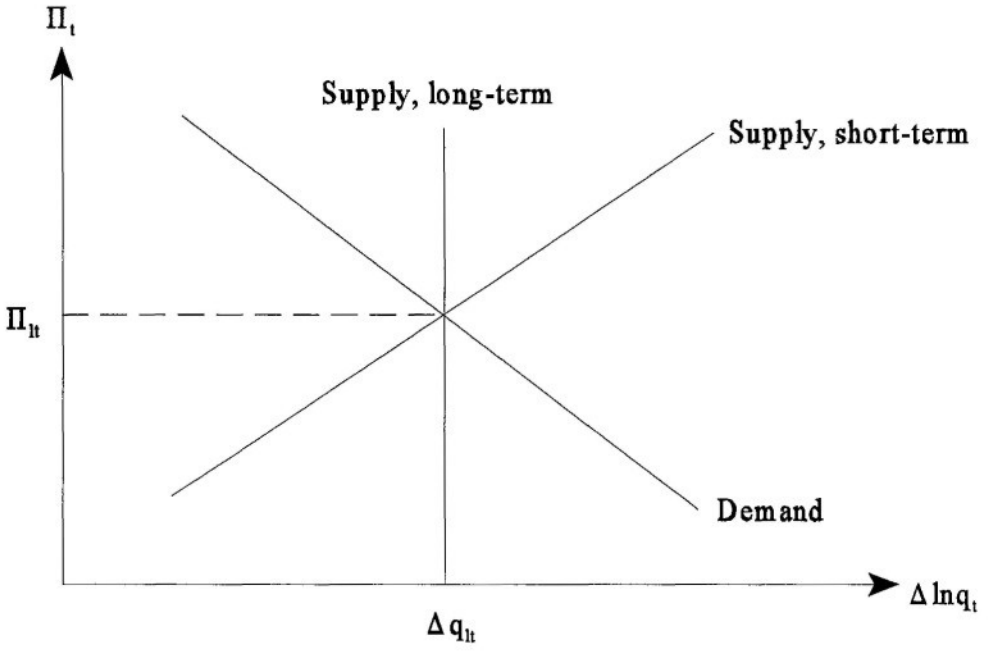
[11]Note that the underlying price level is defined as the price level of domestic output supplied

(continued...)

Chart 1. Aggregate demand and supply curves



goods, P_{ct}, and investment goods, P_{it}, are computed as a weighted average of the domestic price level and the exogenously determined price level of imports of goods and nonfactor services, P_{mt}:

$$P_{ct} = \xi_1 P_t + (1-\xi_1) P_{mt} E_t \quad (19)$$

$$P_{it} = \xi_2 P_t + (1-\xi_2) P_{mt} E_t \quad (20)$$

The implicit GDP deflator, P_{qt}, is computed as nominal GDP divided by real GDP:

$$P_{qt} = Q_t / q_t \quad (21)$$

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[11](...continued)
domestically. This means that the underlying domestic price level will be different from the implicit GDP deflator to the extend that changes in export prices are different from prices on output supplied domestically.

where $Q_t = P_{ct}c_{pt} + P_{ct}c_{gt} + P_{it}i_t + P_{xt}E_tx_t - P_{mt}E_tm_t$.

III. Simulation Experiment

In this section an illustrative simulation of an applied version of the model is carried out mainly to show the input requirements and some examples of the available output tables. However, at this point it is not the purpose to explain all the details of the simulation results. Based on actual annual data for El Salvador through 1996, the model has been simulated for the period 1997-01 using a representative set of coefficients which either have been estimated using standard econometric techniques or determined through less rigorous methods. However, it should be noticed that the coefficients have been determined for illustrative purposes, and that further work may be needed to improve the quality of the estimates.

Since the model is simultaneous, i.e., it is not possible to solve each relation of the model one at a time, the model is solved through an iterative procedure. For that purpose the model has been written into a Microsoft Excel worksheet and simulations have been computed using the Solver add-in utility.[12] In Excel, the specification of the model has been divided between the simultaneous bloc, which is the core part of the model discussed in the former section, and the bloc outside the simultaneous bloc. The precise formulation of the simultaneous bloc is provided in the **Appendix**.

The required input for historical data and future values for the exogenous variables are summarized in **Table 1** of the **attachment**. The first three columns of the table show variable explanations, variable model names, which are similar to those used in the previous section, and the variable status. The variable status possibilities are exogenous (EXOG), endogenous (END), and not in the model (NM). The 1996 column holds historical data while the 1997-01 columns hold values of the target variables of the program and projections of other exogenous variables. Shaded areas indicate that user input is required to run the simulation.

In the example, the scenario for the exogenous variables during 1997-01 includes an increase of the long-term real GDP growth rate from 3.8 to 4.3 percent (equals the calculated maximum sustainable growth rate which increases because of a jump in the growth of total factor productivity from 0.6 percent to 1 percent); export volume growth falling from 7 to 5 percent; a small reduction in nonfinancial public sector expenditure from 14.3 to 14 percent of GDP (including investment of 4 percent of GDP); increasing gross reserves from 4.4 months of imports in 1996 to 5 months in 2000; maintaining the

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[12] Simulations using the Solver utility in Excel are more slowly computed compared to using some of the econometric time series packages, but the advantage of using Excel is that as standard IMF software it is known and available to all users, and in addition the possibilities of creating a more user friendly interface are better.

current levels of reserve requirements; a reduction of the end-of-period inflation rate for domestic goods from almost 9.5 percent in 1996 to 3 percent in 2001; and worsening of the terms of trade as prices on exports and imports are assumed to increase by 14 percent and 9 percent, respectively, during the projection period. In addition, since the exchange rate is treated as endogenous, a flexible exchange rate system is assumed for the simulation.

In **Table 2**, the coefficient matrix for the behavioral relationships is shown. Note that the constant terms in the private consumption and demand for money relations are computed in such a way that the error correction terms initially are zero.

With the information of **Table 1 and 2**, the model is ready for simulation. The results are presented in Table 3-7. **Table 3** gives an overview of the most important objectives and policy targets of the financial program. **Table 4** shows the outcome for the four sectors of the economy in nominal terms measured in millions of colones. **Table 5** shows the outcome for the real sector in constant 1996 prices and the percentage changes of the various price indices. **Table 6** shows the outcome for the four sectors in percent of GDP with the same format as Table 4. Finally, **Table 7** shows the balance of payments in U.S. dollars.

The results summarized in **Table 3** will be discussed briefly. In the first section of the table, the three main objectives of the program in terms of growth, inflation, and gross international reserves are shown.[13] The economic policies consistent with these objectives are specified in the second section of the table as targets for: (I) the NDA and NIR (or NFA) of the central bank, and (ii) the total domestic financing and overall balance of the nonfinancial public sector.[14] In this particular case, the fiscal efforts over the medium-term of the program are characterized by a reduction of the overall balance (including grants) from a deficit of about 2 percent of GDP in 1996 to close to balance in 2000-01. As growth of GDP in the beginning of the program period is below the long-term potential, the fiscal consolidation required to obtain the program objectives are less demanding in the first two years of the program.

In the third and final section of Table 3, other important characteristics of the program are summarized. First, the program seems to be characterized by external

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[13]The central bank reserve requirements are also included as a program objective. Often, programs for countries with high reserve requirements include some gradual lowering of the requirements as more market oriented monetary policy instruments are introduced. The behavior of net domestic assets of the central bank takes into account the changes in reserve requirements.

[14]These targets are obviously also the main candidates for the program performance criteria although these would be formulated in terms of ceilings/floors rather than targets.

viability as the current account deficit remains at a level around 1.5 percent of GDP, and this is supported by predicted exchange rate stability after initial annual depreciations of 3-5 percent in 1997-99. Second, reserve money is programmed to behave similar to the demand for money, since the parameters of the money multiplier are assumed to remain unchanged. Third, annual inflation based on the GDP deflator is programmed to fall from 9 percent in 1996 to 3.5 percent in 2001.[15] Fourth, private investment is assumed to expand somewhat, in particular in 1999, to take advantage of the projected increase in total factor productivity growth.

IV. Concluding remarks

The model discussed above provides a useful starting point for the design of a consistent framework for the financial programming exercise. The basic structure of the model supplies the tools for setting up a growth-oriented medium-term adjustment program and at the same time develops the guidelines for fiscal and monetary policies that satisfy the requirements for internal and external balance. An important element of this paper is to demonstrate the practical application of the financial programming model, and to start the work on creating a user friendly tool that could be used easily in the IMF's country work. The illustrative application of the model on El Salvador showed the power of the framework presented here to provide consistent and detailed output to be used directly in the formulation of program benchmarks.

There are several areas where the model could be modified or extended. First, the growth bloc of the model could be extended with a behavioral relationship for private investment which would change the growth rate of real GDP in the long-term to an endogenous variable. Second, since the behavioral equations of private consumption and the demand for money are important for aggregate demand, and therefore also critical for the programmed fiscal and monetary policy, more sophisticated specifications of these relationships could be of importance. Generally, more emphasis should be directed towards the actual empirical formulation of the behavioral assumptions in the model. Third, an external debt bloc would be useful in order to give a more complete description of the debt dynamics both in terms of incorporating the fiscal and external impacts of changes in interest payments, and to present the relevant debt and debt service ratios over the course of the simulation period. Finally, the current model does not include an interest

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[15]Note the difference between the underlying inflation and the change in the GDP deflator. The underlying inflation is based on the price index for output supplied domestically while the GDP deflator also depends on prices for exports and imports. This implies that the underlying inflation is less responsive to discrete changes in domestic currency prices of exports and imports compared to the GDP deflator.

rate[16], and the performance of the model could be enhanced by incorporating the role of interest rates for investment, savings, and the money demand. Again, a more thorough empirical analysis could help to determine the importance of interest rates in these areas. Also, with the inclusion of interest rates, some behavior of the flow of private capital on the balance of payments could be specified.

[16]Although the rate of inflation is included to approximate the cost of holding money in the money demand function.

Simultaneous Equations of Financial Programming Model

I. Growth and investments

$$LN(1+ZQL)-\beta 11*LN(K/K_-1)-\beta 12*ZE-ZQT=0 \quad (1)$$

$$IT-(K-(\delta *K_-1))=0 \quad (2)$$

$$IP-(IT-IG)=0 \quad (3)$$

$$IG-(IG_Q*Q*PQ)/PI=0 \quad (4)$$

II. The goods market

$$Q-CG-CP-IT-IS-X+M=0 \quad (5)$$

$$LN(CP/CP_-1)-(\beta 21+\beta 22*LN(CP_-1/CP_-2)+\beta 23*LN(YDP/YDP_-1)+ \gamma 21*(LN(CP_-1)+\gamma 22 *LN(YDP_-1))=0 \quad (6)$$

$$CG-(CG_Q*Q*PQ)/PC=0 \quad (7)$$

$$YD-(((Q*PQ)+(E*(FS_VE+G_VE)))/PQ)=0 \quad (8)$$

$$YDP-(((Q*PQ)+(E*(FS_VE+G_VE))-RVN_V)/PQ)=0 \quad (9)$$

III. The money market

$$HM_V-(NFACB_V+NDACB_V)=0 \quad (10)$$

$$M1_V-(\mu *HM_V)=0 \quad (11)$$

$$LN((M1_V/PEOP)/(M1_V_-1/PEOP_-1))-(\beta 41+\beta 42*LN(YD/YD_-1)+ \beta 43*LN((PEOP/PEOP_1)/(PEOP_-1/PEOP_-2))+\gamma 41*(LN(M1_V_-1/PEOP_-1)+ \gamma 42*LN(YD_-1)+\gamma 43*LN(PEOP_-1/PEOP_-2)))=0 \quad (12)$$

IV. The balance of payments

$$CAB_V-((PX*X*E)-(PM*M*E)+E*(FS_VE+G_VE))=0 \quad (13)$$

$$CAB_V-CNIR_V+E*(CFCCB_VE+CFCG_VE+CFCP_VE)=0 \quad (14)$$

$$LN(M-(MP_VE/PM))-\beta 31*LN(PM*E/P)-LN(\beta 32*(CP+CG)+\beta 33*(IT))=0 \quad (15)$$

GOR_VE-(GORM*PM*M/12)=0 (16)

NIR_VE-(GOR_VE+GOL_VE+NFP_VE)=0 (17)

CNIR_V-(E*(NIR_VE-NIR_VE_-1))=0 (18)

NIR_V-(CNIR_V+E*NIR_VE_-1)=0 (19)

NFACB_V-(NIR_V+E*FCCB_VE)=0 (20)

V. The public sector

RVN_V-(((PC*CG)+(PI*IG))-((CFCG_VE*E)+CDCGB_V+CDCGCB_V+CB_V)+ ((E*INTGF_VE)+INTGD_V+NL_V-REST_V)-GAP_V)=0 (21)

VI. The price level

((PEOP-PEOP_-1)/PEOP_-1)-((PEOP_-1-PEOP_-2)/PEOP_-2)-β71*((Q/QL)-1)=0 (22)

PC-(β51*P+(1-β51)*PM*E)=0 (23)

PI-(β61*P+(1-β61)*PM*E)=0 (24)

PQ-(((PC*(CP+CG+IS))+(PI*IT)+(PX*X*E)-(PM*M*E))/Q)=0 (25)

Variable names

The key to the variable extensions are: _V: nominal values; _VE: foreign currency (US$) nominal values (for exogenous variables, future values are calculated for unchanged exchange rates); and _-1: a one period lag. All other variables are in real values, unless otherwise indicated. All Greek letters are coefficients.

Endogenous variables in simultaneous bloc:

Q	Output or GDP
K	Stock of capital
IT	Total investments
IP	Private sector investments
IG	Public sector investments
YD	National disposable income
YDP	Private disposable income
CP	Private consumption
CG	Public consumption
M	Total import of goods and nonfactor services

RVN_V	Total public sector revenue
CB_V	Change in the stock of public sector bonds held by the nonbank private sector
HM_V	Reserve money
M1_V	Broad money defined as M1
NDACB_V	Net domestic assets of the central bank
PC	Price level of consumer goods
PI	Price level of investment goods
PQ	Implicit GDP deflator
E	Nominal exchange rate
CAB_V	Current account balance of the balance of payments
GOR_VE	Gross official foreign exchange reserves
NIR_VE	Net internal reserves of the central bank (in US$)
CNIR_V	Change in net international reserves of the central bank (in local currency)
NIR_V	Net international reserves on the central bank (in local currency)
NFACB_V	Net foreign assets of the central bank

Exogenous variables in simultaneous bloc:

ZQL	The growth rate of long-term output
ZQT	The growth rate of long-term output explained by changes in total factor productivity
ZE	The growth rate of employment
IG_Q	Public sector investments in percent of GDP
CG_Q	Public sector consumption in percent of GDP
IS	Investment in inventories
X	Total export of goods and nonfactor services
FS_VE	External factor services payments, net
G_VE	Foreign grants
CFCCB_VE	Change in net foreign credit to the central bank
CFCG_VE	Change in net foreign credit to the nonfinancial public sector
CFCP_VE	Change in net foreign credit to the private sector
MP_VE	Import of goods and services directly linked to externally financed projects
GORM	Gross official foreign exchange reserves in months of imports of goods and nonfactor services
GOL_VE	Gross official foreign exchange liabilities
NFP_VE	Net IMF position
FCCB_VE	Net foreign credit to the central bank
CDCGB_V	Change in net domestic credit to the nonfinancial public sector from the commercial banks
CDCGCB_V	Change in net domestic credit to the nonfinancial public sector from the central bank
INTGF_VE	Nonfinancial public sector foreign interest payments
INTGD_V	Nonfinancial public sector domestic interest payments

NL_V	Net lending from the nonfinancial public sector
REST_V	The overall balance of the rest of the public sector
P	Price index for domestic goods (average)
PEOP	Price index for domestic goods (end of period)
PM	Price index for imported goods (average)

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Table 1. El Salvador: Input for Simulation of Financial Programming Model
(In millions of colones, unless otherwise specified)

	Name	Status 1/	1996	1997	1998	1999	2000	2001
Real Sector:								
Total resources		END	118671					
Gross domestic product	Q	END	92675					
Imports of goods & NFS	M	END	25996					
Total expenditures		END	118671					
Private consumption	CP	END	78945					
Public consumption	CG	END	9378					
Private investment	IP	END	12233					
Public investment	IG	END	3912					
Changes in inventories 2/	IS	EXOG	0	0	0	0	0	0
Export of goods & NFS	X	END	14203					
Memorandum items:								
National disposable income	YD	END	103093					
Private disposable income	YDP	END	90033					
Growth of real export of goods and NFS	ZX	EXOG	8.8%	7.0%	6.0%	5.0%	5.0%	5.0%
Growth of real GDP, short-term	ZQ	END	2.0%					
Growth of real GDP, long-term	ZQL	EXOG	3.8%	3.8%	3.8%	4.3%	4.3%	4.3%
Growth of total factor productivity	ZQT	EXOG	0.6%	0.6%	0.7%	1.0%	1.0%	1.0%
Maximum sustainable GDP growth		END	3.5%	3.5%	3.8%	4.3%	4.3%	4.3%
External Sector:								
Current account	CAB	END	-1375					
Export of goods & NFS	X	END	14203					
Imports of goods & NFS	-M	END	-25996					
Factor services 3/	FS	EXOG	-1178	-1220	-1452	-1568	-1737	-1914
Foreign grants 3/	G	EXOG	11597	12082	12573	12930	13298	13678
Capital account		EXOG	2814	2628	3122	2766	2671	2744
NFPS financing 3/	CFCG	EXOG	2108	1971	2544	2185	2240	2350
Central bank financing 3/	CFCCB	EXOG	447	254	280	276	255	250
Private financing 3/	CFCP	EXOG	259	403	298	305	176	144
Change in net international reserves	CNIR	END	1439					
Memorandum items:								
Direct foreign financed project import 3/	MP	EXOG	1203	1126	1402	1213	1230	1275
Nonfinancial Public Sector:								
Total revenue and grants	RVN	END	13060					
Of which: foreign grants 3/	GG	EXOG	149	140	130	120	110	100
Total expenditures		END	14711					
Consumption	CG	END	9378					
Investment	IG	END	3912					
Domestic interest payments	INTGD	EXOG	610	693	748	801	841	883
Foreign interest payments 3/	INTGF	EXOG	900	1008	1058	1169	1289	1415
Net lending	NL	EXOG	-89	-80	-50	0	0	0
Balance of the rest of NFPS	REST	EXOG	18	0	0	0	0	0
Overall balance (excl. foreign grants)		END	-1782					
Overall balance (incl. foreign grants)		END	-1633					
Total financing		END	1633					
Net foreign financing 3/	CFCG	EXOG	2108	1971	2544	2185	2240	2350
Net domestic credit, central bank	CDCGCB	END	671	-188	-83	-300	-300	0
Net domestic credit, banks	CDCGB	EXOG	-680	0	0	0	0	0
Net domestic bonds	CB	END	-466					
Memorandum items:								
Current consumption in percent of GDP	CG_Q	EXOG	10.1%	10.0%	10.0%	10.0%	10.0%	10.0%
Investments in percent of GDP	IG_Q	EXOG	4.2%	4.0%	4.0%	4.0%	4.0%	4.0%

....table continues

Table 1. El Salvador: Input for Simulation of Financial Programming Model (concluded)
(In millions of colones, unless otherwise specified)

	Name	Status 1/	1996	1997	1998	1999	2000	2001
Banking Sector:								
I. Consolidated								
Total assets		NM	39591					
Net foreign assets	NFA	NM	5296					
Net domestic assets	NDA	NM	7923					
Total liabilities to private sector	MQM	NM	39591					
Money	M1	END	7495					
Currency in circulation	HC	NM	2981					
Sight deposits	DS	NM	4514					
Quasi money	MQ	NM	32096					
Time and savings deposits	DT	NM	31015					
Other liabilities		NM	1081					
II. Central bank								
Total assets		END	11832					
Net foreign assets	NFACB	END	7693					
Net international reserves	NIR	END	9622					
Net Fund position 3/	NFP	EXOG	0	0	0	0	0	0
Gross official reserves	GOR	END	9625					
Gross official liabilities 3/	GOL	EXOG	-3	-3	-3	-3	-3	-3
MLT foreign liabilities 3/	FCCB	EXOG	-1929	-1675	-1395	-1119	-864	-614
Net domestic assets	NDACB	END	4139					
Net dom. credit to the public sector	DCGCB	EXOG	3871	3683	3600	3300	3000	3000
Net dom. credit to the private sector	DCPCB	END	-1940					
Other assets, net	OANCB	END	2208					
Total liabilities		END	11832					
Reserve money	HM	END	11832					
Currency in circulation	HC	NM	2981					
Cash in vault	RC	NM	500					
Bank reserve deposits	RD	NM	8351					
Memorandum items:								
Gross reserves in months of import	GOR_M	EXOG	4.4	4.5	4.7	4.9	5.0	5.0
Bank reserves/Sight and time deposits (pct.)	rr	NM	24.9%					
Bank deposits and cash in vault (pct.)	r	EXOG	24.9%	24.9%	24.9%	24.9%	24.9%	24.9%
Bonds (pct.)	b	NM	0.0%					
Currency deposits/Sight deposits (pct.)	c	EXOG	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%
Time deposits/Sight deposits (pct.)	d	EXOG	687.1%	687.1%	687.1%	687.1%	687.1%	687.1%
Money multiplier	mu	EXOG	0.63	0.63	0.63	0.63	0.63	0.63
Price and Exchange Rate Indices: 4/								
Domestic goods prices (EOP)		EXOG	1.05	1.12	1.18	1.24	1.29	1.33
Domestic goods prices (EOP, rebased)	PEOP	EXOG	1.00	1.07	1.13	1.19	1.24	1.27
Domestic goods prices	P	END	1.00	1.08	1.15	1.21	1.27	1.31
Implicit GDP deflator	PQ	END	1.00					
Consumer goods prices	PC	END	1.00					
Investment goods prices	PI	END	1.00					
Import goods prices	PM	EXOG	1.00	1.02	1.05	1.08	1.11	1.14
Export goods prices	PX	EXOG	1.00	1.00	1.01	1.04	1.07	1.09
Exchange rate (L/US$)	E	END	1.00					
Nominal exchange rate (L/US$)	EN	END	8.75					

1/ The variables are either endogenous (END), exogenous (EXOG), or not included in model (NM).
2/ Projections assume unchanged price levels.
3/ Projections assume unchanged foreign exchange rate.
4/ All indices, except the end-of-period price index, have base 1.0 in 1996.

Table 2. El Salvador: Coefficient matrix for Financial Programming Model

	Real Capital Stock	Real Output	Employment	Real Private Consumption	Real Import	Real Money Demand	Consumption Prices	Investment Prices	Inflation Supply side
	k(t)	ln q(t) -ln q(t-1)	ln l(t) -ln l(t-1)	ln cp(t) -ln cp(t-1)	ln (m(t) -mp(t))	ln M1(t) -ln P(t)	PC(t)	PI(t)	P(t)/P(t-1)-1
Constant		0.006	0.025	-0.06		-0.26			
i(t)	1.00								
k(t-1)	0.80								
ln k(t)-ln k(t-1)		0.44							
ln l(t)-ln l(t-1)		0.56							
ZQT(t)									
ln cp(t-1)-ln cp(t-2)				0.20					
ln ydp(t)-ln ydp(t-1)				0.70					
ln yd(t)-ln yd(t-1)						0.60			
ln(PM(t)*E(t)/P(t))					-1.00				
ln P(t)-2 ln P(t-1)+ln P(t+2)						-0.20			
P(t)							0.90	0.53	
PM(t)							0.10	0.47	
CP(t)+CG(t)					0.23				
IT(t)					0.30				
P(t-1)/P(t-2)-1									1.00
q(t)/ql(t)-1									2.00
Error correction term:				-0.50		-0.10			
ln cp(t-1)				1.00					
ln ydp(t-1)				-1.00					
ln M1(t-1)-ln P(t-1)						1.00			
ln yd(t-1)						-1.00			
ln P(t-1)-ln P(t-2)						0.50			

Explanation of variable names:

cp	Real private consumption
cg	Real public consumption
E	Exchange rate (Colones per US dollar)
M1	Aggregate money supply
i	Real investments
k	Real capital stock
m	Real imports of goods and nonfactor services
P	Price level on domestic output supplied domestically.
PC	Price level on consumption goods
PI	Price level on investment goods
PM	Price level on imported goods and nonfactor services
q	Real domestic output (GDP)
ql	Long-run real domestic output (GDP)
yd	Real national disposable income
ydp	Real private disposable income
ZQT	Growth of total factor productivity

Table 3. El Salvador: Financial Program Objectives and Policy Targets
(In millions of colones, unless otherwise specified)

	Actual 1996	1997	1998	1999	2000	2001
Program Objectives:						
Real growth of GDP, short-term	2.0%	3.0%	4.1%	4.9%	3.6%	4.4%
Real growth of GDP, long-term	3.8%	3.8%	3.8%	4.3%	4.3%	4.3%
Underlying inflation rate (end of period)	9.4%	7.0%	5.5%	5.4%	4.0%	3.0%
Reserve requirements	24.9%	24.9%	24.9%	24.9%	24.9%	24.9%
Gross international reserves in months of import	4.4	4.5	4.7	4.9	5.0	5.0
Policy Targets:						
Target for the NDA of the central bank 1/	4139	4158	3867	3797	3673	3673
Target for the NFA of the centrak bank 2/	7693	8762	10136	11419	12581	13610
Target for the NIR of the central bank 2/	9622	10437	11531	12538	13445	14225
Change in NIR (US$ millions)	165	93	125	115	104	89
Target for total domestic financing of the NFPS	-475	-318	-568	-1354	-2430	-1919
Targets for the NFPS in percent of GDP:						
Overall balance, excl. grants	-1.9%	-1.8%	-2.1%	-1.0%	-0.2%	-0.7%
Overall balance, incl. grants	-1.8%	-1.7%	-1.9%	-0.9%	-0.1%	-0.6%
Total revenue, incl. grants	14.1%	13.9%	13.7%	14.8%	15.6%	15.2%
Total expenditures	15.9%	15.6%	15.6%	15.7%	15.7%	15.7%
Other key variables:			(In percent of GDP)			
External current account	-1.5%	-1.8%	-1.9%	-1.6%	-1.5%	-1.6%
External capital account	3.0%	2.6%	3.0%	2.5%	2.3%	2.2%
Total investments	17.4%	17.5%	17.3%	17.6%	17.8%	17.8%
Private investments	13.2%	13.5%	13.3%	13.6%	13.8%	13.8%
Public investments	4.2%	4.0%	4.0%	4.0%	4.0%	4.0%
Total consumption	95.3%	95.3%	95.2%	94.2%	93.6%	93.1%
Private consumption	85.2%	85.3%	85.2%	84.2%	83.6%	83.1%
Public consumption	10.1%	10.0%	10.0%	10.0%	10.0%	10.0%
			(Growth in percent)			
Reserve money	7.4%	9.2%	8.4%	8.7%	6.8%	6.3%
Money demand (M1)	7.7%	9.2%	8.4%	8.7%	6.8%	6.3%
Real private consumption	2.5%	2.8%	3.7%	3.6%	2.7%	3.8%
Real private investments	-6.5%	5.6%	2.6%	6.1%	4.5%	4.3%
Real capital stock	4.1%	4.1%	3.8%	4.2%	4.2%	4.2%
Total factor productivity	0.6%	0.6%	0.7%	1.0%	1.0%	1.0%
Implicit GDP deflator	9.0%	7.6%	6.1%	5.5%	4.7%	3.5%
Consumer prices	9.8%	7.9%	6.3%	5.6%	4.8%	3.6%
Exchange rate (Colones per US$)	0.0%	3.3%	4.8%	4.3%	2.5%	1.6%

1/ Defined as the difference between reserve money and the NFA of the central bank evaluated for a constant exchange rate.
2/ Targets computed for a constant exchange rate.

Table 4. El Salvador: Simulation Output of Financial Programming Model
(In millions of colones, unless otherwise specified)

	Name	Actual 1996	1997	1998	1999	2000	2001
Real Sector:							
Total resources		118671	131458	145301	160290	173606	187459
Gross domestic product	Q	92675	102699	113421	125596	136222	147273
Imports of goods & NFS	M	25996	28760	31880	34693	37384	40186
Total expenditures		118671	131458	145301	160290	173606	187459
Private consumption	CP	78945	87602	96640	105749	113814	122446
Public consumption	CG	9378	10270	11342	12560	13622	14727
Private investment	IP	12233	13813	15136	17087	18770	20365
Public investment	IG	3912	4108	4537	5024	5449	5891
Changes in inventories	IS	0	0	0	0	0	0
Export of goods & NFS	X	14203	15665	17646	19870	21950	24030
Memorandum items:							
National disposable income	YD	103093	114482	126236	139197	150451	161987
Private disposable income	YDP	90033	99859	110454	120572	129279	139908
Capital-Output ratio	COR	0.8	0.8	0.8	0.8	0.8	0.8
External Sector:							
Current account	CAB	-1375	-1873	-2194	-1988	-2043	-2312
Export of goods & NFS	X	14203	15665	17646	19870	21950	24030
Imports of goods & NFS	-M	25996	28760	31880	34693	37384	40186
Factor services	FS	-1178	-1260	-1571	-1771	-2012	-2253
Foreign grants	G	11597	12481	13610	14606	15403	16097
Capital account		2814	2715	3379	3125	3094	3229
NFPS financing	CFCG	2108	2037	2754	2469	2595	2765
Central bank financing	CFCCB	447	262	303	312	295	294
Private financing	CFCP	259	416	322	345	204	169
Change in net international reserves	CNIR	1439	842	1185	1137	1051	917
Financing gap	GAP	0	0	0	0	0	0
Nonfinancial Public Sector:							
Total revenue	RVN	13060	14314	15537	18590	21241	22321
Of which: official grants	GG	149	145	141	136	127	118
Total expenditures		14711	16032	17723	19705	21405	23167
Consumption	CG	9378	10270	11342	12560	13622	14727
Investment	IG	3912	4108	4537	5024	5449	5891
Domestic interest payments	INTGD	610	693	748	801	841	883
Foreign interest payments	INTGF	900	1041	1146	1320	1493	1666
Net lending	NL	-89	-80	-50	0	0	0
Balance of the rest of NFPS	REST	18	0	0	0	0	0
Overall balance (excl. foreign grants)		-1782	-1863	-2327	-1250	-292	-964
Overall balance (incl. foreign grants)		-1633	-1718	-2186	-1115	-165	-846
Total financing		1633	1718	2186	1115	165	846
Net foreign financing	CFCG	2108	2037	2754	2469	2595	2765
Net domestic credit, central bank	CDCGCB	671	-188	-83	-300	-300	0
Net domestic credit, banks	CDCGB	-680	0	0	0	0	0
Net domestic bonds	CB	-466	-130	-485	-1054	-2130	-1919
Financing gap	GAP	0	0	0	0	0	0
The Central Bank:							
Total assets		11832	12920	14003	15216	16254	17283
Net foreign assets	NFACB	7693	9051	10973	12899	14572	16018
Net international reserves	NIR	9622	10782	12483	14163	15573	16740
Net Fund position	NFP	0	0	0	0	0	0
Gross official reserves	GOR	9625	10785	12486	14166	15577	16744
Gross official liabilities	GOL	-3	-3	-3	-3	-3	-4
MLT foreign liabilities	FCCB	-1929	-1731	-1510	-1264	-1001	-723
Net domestic assets	NDACB	4139	3869	3030	2317	1682	1265
Net dom. credit to the public sector	DCGCB	3871	3683	3600	3300	3000	3000
Net dom. credit to the private sector	DCPCB	-1940	-2022	-2778	-3191	-3526	-3943
Other assets, net	OANCB	2208	2208	2208	2208	2208	2208
Total liabilities/Reserve money	HM	11832	12920	14003	15216	16254	17283
Memorandum items:							
Money demand (M1)	M1	7495	8184	8870	9638	10296	10948
Money multiplier	MU	0.63	0.63	0.63	0.63	0.63	0.63
Gross forex reserves in months of import	GOR_M	4.4	4.5	4.7	4.9	5.0	5.0

Table 5. El Salvador: Simulation Output of Financial Programming Model
(In percent of GDP)

	Name	Actual 1996	1997	1998	1999	2000	2001
Real Sector:							
Total resources		128.1	128.0	128.1	127.6	127.4	127.3
Gross domestic product	Q	100.0	100.0	100.0	100.0	100.0	100.0
Imports of goods & NFS	M	28.1	28.0	28.1	27.6	27.4	27.3
Total expenditures		128.1	128.0	128.1	127.6	127.4	127.3
Private consumption	CP	85.2	85.3	85.2	84.2	83.6	83.1
Public consumption	CG	10.1	10.0	10.0	10.0	10.0	10.0
Private investment	IP	13.2	13.5	13.3	13.6	13.8	13.8
Public investment	IG	4.2	4.0	4.0	4.0	4.0	4.0
Changes in inventories	IS	0.0	0.0	0.0	0.0	0.0	0.0
Export of goods & NFS	X	15.3	15.3	15.6	15.8	16.1	16.3
Memorandum items:							
National disposable income	YD	111.2	111.5	111.3	110.8	110.4	110.0
Private disposable income	YDP	97.1	97.2	97.4	96.0	94.9	95.0
External Sector:							
Current account	CAB	-1.5	-1.8	-1.9	-1.6	-1.5	-1.6
Export of goods & NFS	X	15.3	15.3	15.6	15.8	16.1	16.3
Imports of goods & NFS	-M	28.1	28.0	28.1	27.6	27.4	27.3
Factor services	FS	-1.3	-1.2	-1.4	-1.4	-1.5	-1.5
Foreign grants	G	12.5	12.2	12.0	11.6	11.3	10.9
Capital account		3.0	2.6	3.0	2.5	2.3	2.2
NFPS financing	CFCG	2.3	2.0	2.4	2.0	1.9	1.9
Central bank financing	CFCCB	0.5	0.3	0.3	0.2	0.2	0.2
Private financing	CFCP	0.3	0.4	0.3	0.3	0.1	0.1
Change in net international reserves	CNIR	1.6	0.8	1.0	0.9	0.8	0.6
Nonfinancial Public Sector:							
Total revenue	RVN	14.1	13.9	13.7	14.8	15.6	15.2
Of which: official grants	GG	0.2	0.1	0.1	0.1	0.1	0.1
Total expenditures		15.9	15.6	15.6	15.7	15.7	15.7
Consumption	CG	10.1	10.0	10.0	10.0	10.0	10.0
Investment	IG	4.2	4.0	4.0	4.0	4.0	4.0
Domestic interest payments	INTGD	0.7	0.7	0.7	0.6	0.6	0.6
Foreign interest payments	INTGF	1.0	1.0	1.0	1.1	1.1	1.1
Net lending	NL	-0.1	-0.1	0.0	0.0	0.0	0.0
Balance of the rest of NFPS	REST	0.0	0.0	0.0	0.0	0.0	0.0
Overall balance (excl. foreign grants)		-1.9	-1.8	-2.1	-1.0	-0.2	-0.7
Overall balance (incl. foreign grants)		-1.8	-1.7	-1.9	-0.9	-0.1	-0.6
Total financing		1.8	1.7	1.9	0.9	0.1	0.6
Net foreign financing	CFCG	2.3	2.0	2.4	2.0	1.9	1.9
Net domestic credit, central bank	CDCGCB	0.7	-0.2	-0.1	-0.2	-0.2	0.0
Net domestic credit, banks	CDCGB	-0.7	0.0	0.0	0.0	0.0	0.0
Net domestic bonds	CB	-0.5	-0.1	-0.4	-0.8	-1.6	-1.3
The Central Bank:							
Total assets		12.8	12.6	12.3	12.1	11.9	11.7
Net foreign assets	NFACB	8.3	8.8	9.7	10.3	10.7	10.9
Net domestic assets	NDACB	4.5	3.8	2.7	1.8	1.2	0.9
Net dom. credit to the public sector	DCGCB	4.2	3.6	3.2	2.6	2.2	2.0
Net dom. credit to the private sector	DCPCB	-2.1	-2.0	-2.4	-2.5	-2.6	-2.7
Other assets, net	OANCB	2.4	2.1	1.9	1.8	1.6	1.5
Total liabilities/Reserve money	HM	12.8	12.6	12.3	12.1	11.9	11.7

Table 6. El Salvador: Simulation Output of Financial Programming Model
(In millions of 1996 colones, unless otherwise specified)

	Name	Actual 1996	1997	1998	1999	2000	2001
Real Sector:							
Total resources		118671	122661	127456	132720	137069	142659
Gross domestic product	Q	92675	95421	99332	104243	108014	112816
Imports of goods & NFS	M	25996	27240	28124	28477	29055	29843
Total expenditures		118671	122661	127456	132720	137069	142659
Private consumption	CP	78945	81188	84228	87239	89613	93052
Public consumption	CG	9378	9518	9885	10361	10726	11192
Private investment	IP	12233	12916	13258	14067	14700	15329
Public investment	IG	3912	3841	3974	4136	4267	4434
Changes in inventories	IS	0	0	0	0	0	0
Export of goods & NFS	X	14203	15197	16111	16917	17763	18651
Memo items:							
National disposable income	YD	103093	105847	109875	114896	118632	123421
Private disposable income	YDP	90033	92548	96268	99467	101790	106322
Growth of GDP, short-term	ZQ	2.0%	3.0%	4.1%	4.9%	3.6%	4.4%
Growth of GDP, long-term	ZQL	3.8%	3.8%	3.8%	4.3%	4.3%	4.3%
Growth of exports of goods & NFS	ZX	8.8%	7.0%	6.0%	5.0%	5.0%	5.0%
Growth of imports of goods & NFS	ZM	-6.4%	4.8%	3.2%	1.3%	2.0%	2.7%
Changes in Prices and Exchange Rates:							
Domestic goods prices (end of period)	PEOP	9.4%	7.0%	5.5%	5.4%	4.0%	3.0%
Domestic goods prices	P	.10.9%	8.2%	6.2%	5.4%	4.7%	3.5%
Implicit GDP deflator	PQ	9.0%	7.6%	6.1%	5.5%	4.7%	3.5%
Consumer goods prices	PC	9.8%	7.9%	6.3%	5.6%	4.8%	3.6%
Investment goods prices	PI	5.9%	6.9%	6.8%	6.4%	5.1%	4.0%
Import goods prices	PM	0.7%	2.2%	2.5%	3.0%	3.0%	3.0%
Export goods prices	PX	-7.7%	-0.2%	1.4%	2.8%	2.6%	2.6%
Exchange rate (L/US$)	E	0.0%	3.3%	4.8%	4.3%	2.5%	1.6%
Nominal exchange rate (L/US$)	EN	8.75	9.04	9.47	9.88	10.13	10.30
Exchange rate index (L/US$)	E	1.00	1.03	1.08	1.13	1.16	1.18

Table 7. El Salvador: Simulation Output - The Balance of Payments
(In millions of US dollars)

	Name	Actual 1996	1997	1998	1999	2000	2001
External Sector:							
Current account	CAB	-157	-207	-232	-201	-202	-225
Export of goods & NFS	X	1623	1733	1863	2010	2166	2333
Imports of goods & NFS	-M	2971	3182	3366	3510	3689	3902
Factor services	FS	-135	-139	-166	-179	-199	-219
Foreign grants	G	1325	1381	1437	1478	1520	1563
Capital account		322	300	357	316	305	314
NFPS financing	CFCG	241	225	291	250	256	269
Central bank financing	CFCCB	51	29	32	32	29	29
Private financing	CFCP	30	46	34	35	20	16
Change in net international reserves	CNIR	165	93	125	115	104	89
Financing gap	GAP	0	0	0	0	0	0
Memorandum items:							
Gross foreign exchange reserves	GOR	1100	1193	1318	1433	1537	1626
Gross forex reserves in months of import	GOR_M	4.4	4.5	4.7	4.9	5.0	5.0
Nominal exchange rate (L/US$)	EN	8.8	9.0	9.5	9.9	10.1	10.3